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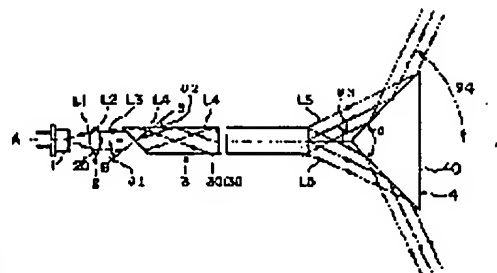
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## (54) OPTICAL DEVICE FOR CONTROLLING EXPANDING ANGLE OF ANNULAR LIGHT RAY

(57)Abstract:

PROBLEM TO BE SOLVED: To transmit an annular light bundle having the uniform distribution of light intensity.

SOLUTION: This device is provided with a parallel light ray generating means 2 of a collimator lens 20, etc., on which a light beam L1 transmitted from a light source 1 such as a semiconductor laser is made incident, converting the incident light L2 to a parallel light bundle L3 and transmitting it, an annular light ray generating means 3 such as a step index type optical fiber 30 or a cylindrical rod 31 on which the parallel light bundle L3 transmitted from the parallel light ray generating means 2 is made incident, converting the incident light L4 to an annular light bundle L5 whose irradiating shape on a virtual plane perpendicular to the optical axis A-A is annular and transmitting it and an expanding angle converting means 4 such as a conical prism 40 for changing the expanded angle  $\theta 3$  (an angle formed between the optical axis A-A and the propagating direction of the annular light bundle L5) of the annular light bundle L5 transmitted from the annular light ray generating means 3 on the way.



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